extended to two years.—Prof. J. Pierpont gives an interesting account of the summer meeting of the Deutsche Mathematiker-Vereinigung held at Munich in September of last year.—Some theorems concerning linear differential equations of the second order is an abstract by Prof. M. Bôcher of certain results which he communicated at the February meeting (see *supra*).—A paper by Dr. M. B. Porter, read at the same meeting, is entitled "A note on the enumeration of the roots of the hypergeometric series between zero and one." It is a continuation of a note published in the May (1897) number of the *Bulletin*.—Dr. J. Sommer reviews Hilbert's "Grundlagen der Geometrie," and Prof. E. O. Lovett does the same for Kœnig's "Leçons de Cinématique."—The longer papers read before the Society will, we presume, be printed in the new *Transactions*.—The notes are very full, and there is a fair list of publications.

Bulletin de l'Académie des Sciences de St. Pétersbourg, vol. vii. No. 3.—On the rotation of Jupiter and his spots, by Th. Bredikhin. An analysis of the observations made by the author himself at Moscow, and of some later observations at Pulkova. A comparison of the times of rotation of spots situated in the same latitudes shows that some of them are formed in the lower, and some in the higher strata of Jupiter's atmosphere. Prof. Joukovsky's formulæ hold good as a rule; but a more careful discussion shows that the law of friction must be altered; the latter is proportional to the square or even to a higher degree of velocity. But it would be extremely difficult to make a theoretical discussion if the law be altered in this sense.—The scientific results of the Black Sea expedition, by A. Ostrooumov: iii. Fishes of the Sea of Azov.—Materials for the hydrology of the White Sea and the Murman Sea (Arctic Ocean along the Norman coast), by N. Knipovitch: i. Lists of the Observations.

Vol. vii. No. 4.—The series of Jean Bernoulli, by N. Sonin.—New researches into the spectrum of β Lyræ and η Aquilæ, by A. Belopolsky. These new researches were made with the aid of the 30-in. refractor of Pulkova. The spectroscopic velocities of η Aquilæ showed a periodicity very near to the periodicity of the variations of magnitude, *i.e.* 7 days 4 hours, and it was possible to calculate its orbit. Similarly, as for δ Cephei, it was proved that the changes of brilliancy in η Aquilæ cannot be explained by eclipses of the star. As regards β Lyræ, the former suppositions of the author are now fully confirmed. This star represents a system of two bodies, having at any instant opposite spectroscopic velocities, and one of the two bodies eclipses the other during their revolutions.—Preliminary communication on applications of Rykatschew's method for studying the relations between rainfall and height of water in rivers, by Dr. Harry Gravelius.—The third international balloon ascents of May 1, 1897, by Ed. Stelling.—Observations of the satellites of Mars with the 30 in. refractor at Pulkova, by F. Renz; and on the photographs of Mars, by S. Kostinsky.

Vol. vii. No. 5.—On the changes of pressure under the piston of the air-pump, by Prince Galitzin. Theoretical discussion is compared with direct observation.—Some remarks on the sensibility of the eye, by the same author.—Abstract from the yearly report for 1896 of the Central Physical Observatory, by M. Rykatschew.—On the excretory organs of *Ascaris megalocephala*, by S. Metalnikoff.—On the routes of the cyclones over Russia in 1890-92, preliminary communication, by P. Rybkin.

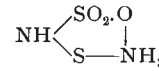
SOCIETIES AND ACADEMIES.

LONDON.

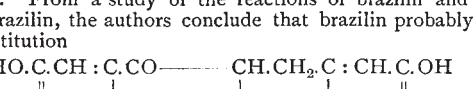
Physical Society, May 11.—Prof. O. J. Lodge, F.R.S., President, in the chair.—A discussion of Prof. Lodge's paper on the controversy concerning Volta's contact force was commenced by Prof. Armstrong. Prof. Armstrong expressed his indebtedness to the president for putting forth clearly what we are trying to understand, and said that it was hardly time for chemists to enter the discussion when physicists themselves differed. There has apparently been a change in front since the time when the effect was supposed to be due either to (1) chemical action between the metals, or (2) oxidation. Prof. Lodge's view is intermediate, but approximates to the second. Prof. Armstrong said that from a practical point the existence of the effect was unknown, because sufficient precautions had never been taken to prevent chemical action. He urged the continuance of experiments similar to those carried out by Mr. Spiers, and stated that modern ideas of chemistry were favourable to the view which Prof. Lodge had taken up with regard to the Volta effect.—Mr. Glazebrook made some remarks upon the meaning of the term E which occurs in the expression for the Peltier effect at the junction of two metals. If we confine our attention to an infinitesimal cycle at the junction of two metals at slightly different temperatures, we get the equation for the Peltier effect in which E is the potential difference at the point considered. If then, assuming reversibility, we sum up all the infinitesimal cycles round a circuit and get a finite cycle, the E.M.F. of the circuit is a function of the two temperatures between which it is working. Differentiating with respect to temperature the total E.M.F. of the circuit, we get an equation which applies to the circuit as a whole, and in which E is the total E.M.F. round the circuit. Mr. Price asked if any critical experiment could be suggested to settle the question.—Dr. Lehfeldt called attention to some experiments which had been performed to measure the potential difference between an electrolyte and a gas. The electrolytes considered were chiefly aqueous solutions, and the potential differences observed varied largely. The surface tensions of the liquids were measured, and it was shown that the variations in the potential difference were very similar to those in surface tension. This suggests, in the case of electrolytes, true physical surface effects, and not chemical action.—The chairman remarked that Dr. Lehfeldt evidently looked upon the metal-ether boundary as being the effective one. The experimental evidence is not sufficient to say exactly which is the effective contact, but it seems to show that the metal-ether effect is of the same order of magnitude as the oxygen layer effect. According to Helmholtz they ought to be related, and they apparently are.—The chairman then read a paper, by Mr. J. B. Tayler, on the heat of formation of alloys. Experiments have been made upon alloys of lead with tin, bismuth and zinc, and of zinc with tin and mercury. The method employed consisted in dissolving (1) the alloy, and (2) the corresponding mixture of metals in mercury, and measuring the heat of solution in each case. On the assumption that the solutions obtained are identical, the difference between the heat of solution of the mixture and that of the alloy is the heat of formation of the latter. The calorimeter was a thin glass tube silvered on the outside and supported by a stouter tube silvered on the inside. Suitable arrangements were adopted for the introduction of the metals or alloys, which were used in the form of filings. Solution was often complete in less than a minute, and rarely took more than two minutes and a half. The alloys first experimented upon contained their constituents in equivalent proportions, and the heats of formation were found to be small in comparison with those found for brass by Galt and Baker. It was thought that only a small percentage of the atoms present had entered into definite chemical combination, and that more reliable results would be obtained by dissolving a small quantity of one metal in an excess of the other, and calculating from the experimental results the heat of formation of the gramme-molecular weight of compound upon the supposition that the whole of the small quantity of metal had entered into chemical combination by the exercise of its normal valency. Using the numbers so obtained to find, by Kelvin's theory, the potential difference which should exist between the metals concerned when put in contact, results were arrived at which agreed neither with the Volta effect nor the Peltier effect, but which were considerably nearer the former than the latter. A paper on the want of uniformity in the action of copper-zinc alloys on nitric acid was read by Dr. J. H. Gladstone. Experiments have been made by dissolving copper-zinc alloys in nitric acid, following the method of Dr. Galt, and adopting the precautions mentioned by him. The reaction between nitric acid and these metals or alloys is very complicated, and there is a difference between the products in the case of an alloy and in the case of the equivalent mixed metals. The gases evolved being small in the experiments performed, attention was directed to the determination of the substances remaining in solution, *i.e.* the nitrous acid and ammonia. The alloys gave much more nitrous acid and less ammonia—in fact, two of the alloys employed produced no ammonia. Discrepancies in results may be due to the fact that the zinc and copper in contact form a zinc-copper couple which in the presence of acid sets up a vigorous action and produces a different evolution of heat. Difficulties arise in the investigation because the alloys used may not be definite chemical compounds, but mixtures of two or more alloys with uncombined zinc and copper. The alloy with 38·38 per cent. of copper appears to be fairly uniform. Different observers disagree as to the amount of heat produced by any

reaction, but the excess of calories in a zinc reaction over those in a copper reaction appears to be fairly constant. Starting with 640 calories, the value, according to Galt, when copper is dissolved in nitric acid of sp. gr. 1·360, we should have 1357 calories when zinc is dissolved, provided the chemical action is the same in each case. All the calorimetrical results from the different specimens of alloys would theoretically lie upon the straight line drawn between 604 and 1357. This is practically so from pure copper to the copper 70 per cent. alloy, but beyond that there is less heat produced than that indicated by the straight line law, the maximum deviation lying at about copper 37 per cent. The specimen containing 38·38 per cent. copper, which is not far from the alloy $CuZn_2$, shows a loss of 32 calories. The only way in which this deficit can be accounted for is by supposing that the action of this alloy on nitric acid produces a larger quantity of nitric oxide than in the case of pure copper. But, allowing full force to this argument, it cannot account for as much as 10 calories of the deficit. There is, therefore, a residual deficit as yet unaccounted for on chemical grounds. The author states that it is desirable that experiments should be conducted on the zinc-copper alloys with solvents which give a simpler chemical action than that produced by nitric acid. The chairman pointed out that the results obtained by Galt for an alloy which appeared to be a chemical compound, were in close agreement with what would be expected from the existence of the Volta contact force. Prof. Armstrong said that the action of nitric acid on brass or zinc and copper was a function of the quantity of acid present, its strength, the temperature and the pressure; and that, therefore, it was unsatisfactory to conduct experiments using nitric acid as a solvent. He suggested the use of a solution of bromine in which finely-powdered zinc, copper and brass are easily soluble with a simple chemical reaction. Mr. Tomlinson pointed out that it was impossible to use the ordinary formula for the calculation of the Volta effect from the heat of formation of alloys, unless we know exactly the chemical composition of the alloy which is produced. Mr. W. R. Cooper, referring to Mr. Tayler's paper, said it was difficult to see that anything could be proved by the application of the Kelvin theory to a metallic contact, unless there is ground for believing that some particular alloy of fixed composition is always formed. There is also a further difficulty in converting heat of formation into E.M.F. in cases where the metals have different valencies, for there is no reason why one valency should be selected rather than the other. Referring to Dr. Gladstone's paper, Mr. Cooper said that it was possible that the difference in the reducing powers of mixtures and alloys might be due to local action, which would be more pronounced in the case of alloys. More hydrogen would be evolved, and the reduction would be more complete.—Prof. S. P. Thompson then showed an electromagnetic experiment. A circular coil capable of carrying a strong current was placed with its axis horizontal in a tank of water. Into the tank were also placed some small magnets in sealed glass tubes so adjusted as to have a density approximately equal to that of water. The magnets just floated or just sank. On running a current through the coil it was possible to "fish" for the magnets, which, acted upon by the magnetic field, immediately made their way to the coil. When the current was carefully reversed upon the approach of a magnet, repulsion instead of attraction took place, and the magnet retreated. In general, however, reversal of the current produced reversed polarity in the magnet, and attraction still persisted.—The Society then adjourned until May 25.

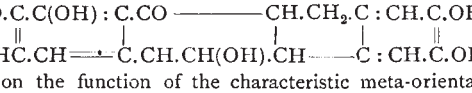
Chemical Society, May 3.—Prof. T. E. Thorpe, President, in the chair.—The following papers were read:—The substituted nitrogen chlorides and nitrogen bromides derived from ortho- and para-acet-toluide, by F. D. Chattaway and K. J. P. Orton. Hypochlorous and hypobromous acids convert ortho- and para-acet-toluide into substituted nitrogen chlorides and bromides, which readily undergo transformation into the isomeric substituted toluides.—The estimation of hypoiodites and iodates; and the reaction of iodine monochloride with alkalis, by K. J. P. Orton and W. L. Blackman. The authors' method of estimating hypoiodites is based on the oxidation of sodium arsenite by hypoiodites, but not by iodates. The initial reaction of iodine monochloride and alkalis is represented by the equation $ICl + 2MOH = MIO + MCl + H_2O$; conversion of the metallic hypoiodite into iodide and iodate becomes complete after twenty-four hours.—Products of the action of sulphur dioxide on ammonia, by E. Divers. Amongst the products of spontaneous decomposition of ammonium amidosulphite is found a substance of acid properties to which the author assigns the constitution



—On brazilin (iv.), by A. W. Gilbody, W. H. Perkin, jun., and J. Yates. From a study of the reactions of brazilin and trimethylbrazilin, the authors conclude that brazilin probably has the constitution



—On hæmatoxylin (v.), by W. H. Perkin, jun., and J. Yates. The study of the oxidation products of tetramethylhæmatoxylin leads to the view that hæmatoxylin has the constitution



—Note on the function of the characteristic meta-orientating groups, by A. Lapworth.

Anthropological Institute, April 24.—Mr. C. H. Read, President, in the chair.—Dr. W. H. R. Rivers described a genealogical method of collecting social and vital statistics which he had used with success when in Torres Straits with the Cambridge Anthropological Expedition. Genealogies of the inhabitants of Murray Island and Mabuiag were compiled which went back for three to five generations, and included nearly all the families at present on those islands. In working out these genealogies, the only terms of relationship used were father, mother, child, husband and wife, and care was taken to limit those terms to their English sense. The chief difficulties were the prevalence of adoption in Murray Island and the custom of exchanging names in Mabuiag. The trustworthiness of the genealogies was guaranteed by the fact that nearly every detail was derived independently from several informants. These genealogies afford material for the exact study of numerous sociological problems; thus the system of kinship can be worked out very thoroughly by ascertaining the native terms which any individual applies to other members of his family, *i.e.* the subject can be investigated entirely by means of concrete examples, and abstract terms of relationship derived from European sources avoided. The genealogies also afford material for the study of totemism, marriage customs, naming customs, &c. By this method also vital statistics may be collected, both of the present and the past. The genealogies compiled in Torres Straits supply data for the study of the size of families, the proportion of the sexes, the fertility of mixed marriages, &c. The method has the further advantage of bringing out incidentally many facts in the recent history of the community, to which it gives increased definiteness and concreteness. The paper was discussed at some length by the President, Mr. Gomme and Dr. Japp.—Dr. A. C. Haddon, F.R.S., exhibited a large number of lantern slides illustrating various native industries in British New Guinea; the photographs were taken during the recent Cambridge Anthropological Expedition. The most complete series was one showing all the stages in the manufacture of pottery by Port Moresby women; other slides illustrated the manufacture of canoes at Keapara with stone implements. Photographs were shown of the process of pile-driving and the erection of buildings, as well as of fire-making, and various women's industries, such as tattooing, making string, &c.—Mr. Gowland pointed out a number of parallels from Korea to the mode of pottery-making described by Dr. Haddon.—The secretary laid before the meeting a brief account of the proceedings of the Cretan Exploration Fund, and of the discovery by Mr. A. J. Evans, at Gnossus, of a collection of clay tablets inscribed with pictographic signs.

PARIS.

Academy of Sciences.—M. Maurice Lévy in the chair.—The President announced to the Academy the loss by death of M. E. Grimaux, member of the Section of Chemistry.—Preparation of the β-alkyloxy-α-cyanocrotonic esters, isomers of the aceto-alkylcyanacetic esters, by M. A. Haller. The true acetyl-alkylcyanacetic esters, $CH_3.CO.CR(CN).CO.OC_2H_5$, have been prepared by Held by acting with cyanogen chloride upon the sodium derivative $CH_3.CO.CR.Na.CO.OC_2H_5$; the isomeric ester of the enol form, $CH_3.C(OH)=C(CN).CO.OC_2H_5$, are obtained by first converting the sodium into the corresponding

silver derivative, and then treating this with the alkyl iodide. The reactions of the ester so obtained are clearly those of the enolic ester, the alkyl group not being directly united to carbon.—The arable earths of the Canton of Redon from the point of view of phosphoric acid, by M. G. Lechartier. The analyses given show how it is that certain lands in the Canton have been successfully cultivated from time immemorial, without the use of phosphatic manures.—Geographical positions and magnetic observations on the eastern coast of Madagascar, by M. P. Colin. The latitude and longitude of Vatomandry and Mahanoro have been redetermined, and also the values of the magnetic elements at those places. The results show that the existing maps require correction in some respects.—Prof. Burdon-Sanderson was elected a Correspondant for the Section of Medicine and Surgery in the place of the late Sir James Paget.—Positions of fundamental polar stars determined at the Observatory of Lyons, by M. F. Gonnessiat.—Shooting stars observed at Athens during the year 1899, by M. D. Eginitis.—On the method of Neumann and the problem of Dirichlet by M. A. Korn.—On an application of the method of successive approximations, by M. A. Davidoglou.—On the distribution of prime numbers, by M. Helge von Koch.—On gas engines, by M. L. Marchis. A reply to the criticisms of M. Witz.—An electrically driven pendulum, by M. Ch. Féry. The mechanism described is arranged so as to leave the pendulum as far as possible unconstrained.—The heat of neutralisation of hydrogen peroxide by lime, by M. de Forcrand.—Solubility of a mixture of salts having a common ion, by M. Charles Touren. The curve showing the relation between the solubility of potassium bromide in solutions of potassium bromide of different concentrations is not coincident with the corresponding curve for potassium nitrate and chloride. Hence the law proposed by Nernst, that equivalent solutions of nitrate and bromide should lower the solubility of the chloride to the same extent, is not verified. The author notes as an interesting application of the phase rule that the study of the solubility of a mixture of salts may show that they are isomorphous, when direct proof may be difficult.—The action of phenyl isocyanate and of aniline upon some γ-ketonic acids, by M. T. Klobb.—Some new compounds of antipyrine with mercury halides, by MM. J. Ville and Ch. Astre.—On acetyl-phenylacetylene and benzoyl-phenylacetylene, by MM. Ch. Moureu and R. Delange. Acetyl-phenylacetylene is quantitatively decomposed by alcoholic potash into phenylacetylene and potassium acetate; benzoyl-phenylacetylene reacts differently, acetophenone being produced.—On the stability of saccharose solutions, by M. Œchsner de Coninck.—Study of the hydrolysis of fibrous tissue, by M. A. Etard. The fibrous tissue of beef, hydrolysed with sulphuric acid, gives a polysaccharide, but practically no leucine.—On some fresh-water *Palaemonidae* of Madagascar, by M. H. Coutière.—On a new edible tuber from the Soudan, the Ousounify, by M. Maxime Cornu. The Ousounify is a tuber resembling the potato in taste, which is cultivated and sold in the Soudan. It is a labiate, and is provisionally named *Plectranthus Coppini*. It has the advantage over the potato that it can be grown in a truly tropical climate.—On the mineralogical composition of the teschenites, by M. A. Lacroix. The hornblende teschenites of Madagascar are analogous, both in structure and mineralogical composition, to the teschenites from Portugal and the Pyrenees, but they contain the nepheline intact. The teschenites from both regions were probably originally identical from the mineralogical point of view.—On the excitement of the electrical nerve of the gymnotus by its own current, by M. Mendelssohn. The electric nerve of the torpedo fish may be excited by its own current.—On the southern aurora observed during the wintering of the Belgian Antarctic expedition.—Barometric deviations produced on the parallel on successive days of the synodic revolution, by M. A. Poincaré.

DIARY OF SOCIETIES.

THURSDAY, MAY 17.

ROYAL SOCIETY, at 4.30.—The Circulation of the Surface Waters of the North Atlantic Ocean: H. N. Dickson.—(1) On Cerebral Anæmia and the Effects which follow Ligation of the Cerebral Arteries; (2) The Influence of Increased Atmospheric Pressure on the Circulation of the Blood. Preliminary Note: Dr. Leonard Hill.—Contributions to the Comparative Anatomy of the Mammalian Eye, chiefly based on Ophthalmoscopic Examination: Dr. Lindsay Johnson.

ROYAL INSTITUTION, at 3.—A Century of Chemistry at the Royal Institution: Prof. J. Dewar, F.R.S.

ZOOLOGICAL SOCIETY, at 4.30.—The Freshwater Fishes of Africa: G. A. Boulenger, F.R.S.

SOCIETY OF ARTS (Indian Section), at 4.30.—The Industrial Development of India: J. A. Baines.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Alternating Current Induction Motors: A. C. Eborall.

CHEMICAL SOCIETY, at 8.—Chlorine Derivatives of Pyridine. VI. The Orientation of some Aminochloropyridines: W. J. Sell and F. W. Dootson.

FRIDAY, MAY 18.

ROYAL INSTITUTION, at 9.—The Structure of Metals: Prof. J. A. Ewing, F.R.S.

EPIDEMIOLOGICAL SOCIETY, at 8.30.

SATURDAY, MAY 19.

ROYAL INSTITUTION, at 3.—South Africa: Past and Future: Dr. Alfred Hillier.

MONDAY, MAY 21.

SOCIETY OF ARTS, at 8.—The Incandescent Gas Mantle and its Use: Prof. Vivian B. Lewes.

ROYAL GEOGRAPHICAL SOCIETY, at 3.—Anniversary Meeting.

VICTORIA INSTITUTE, at 4.30.—Ethics: Rev. Dr. Wace.

TUESDAY, MAY 22.

ROYAL INSTITUTION, at 3.—Brain Tissue and Thought: Dr. A. Hill.

ZOOLOGICAL SOCIETY, at 8.30.—On the Development of the Skeleton of the Tuatera, *Sphenodon* (*Hatteria*) *punctatus*: Prof. G. B. Howes, F.R.S., and H. H. Swinnerton.—On Crustaceans from the Falkland Islands collected by Mr. Rupert Vallentin: Rev. T. R. R. Stebbing, F.R.S.—The Significance of the Hair-slope in certain Mammals: Dr. Walter Kidd.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—Hydroquinone and Colour Impressions: Alfred Watkins.

WEDNESDAY, MAY 23.

SOCIETY OF ARTS, at 8.—Salmon Legislation: J. Willis-Bund.

GEOLOGICAL SOCIETY, at 8.—The Igneous Rocks of the Coast of County Waterford: F. R. C Reed.—On a New Type of Rock from Kentallen and elsewhere, and its Relations to other Igneous Rocks in Argyllshire: J. B. Hill and H. Kynaston.

THURSDAY, MAY 24.

LINNEAN SOCIETY at 3.—Anniversary Meeting.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Annual General Meeting.

FRIDAY, MAY 25.

ROYAL INSTITUTION, at 9.—The Great Alpine Tunnels: Francis Fox.

PHYSICAL SOCIETY, at 5.—Experiments illustrating the Aberration called Coma: Prof. S. P. Thompson, F.R.S.—Notes on the Measurement of some Standard Resistances: R. T. Glazebrook, F.R.S.—On the Strength of Ductile Materials under Combined Stresses: J. J. Guest.

CONTENTS.